

THE COMPUTER BULLETIN

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A PUBLICATION OF THE BRITISH COMPUTER SOCIETY LIMITED

THE COMPUTER BULLETIN is published in alternate months, and is issued free to all members of the Society. Additional copies may be obtained at the published price of each issue from the office of the Society.

The Editors welcome items of interest to members from manufacturers, users and others, and particularly news of forthcoming conferences, courses and lectures.

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THE BRITISH COMPUTER SOCIETY LIMITED

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The Society is open to all those with an interest in computational machinery and techniques allied thereto. Details of membership can be obtained from the Secretary at the London offices or from any of the Honorary Branch Secretaries.

two electronic prodigies

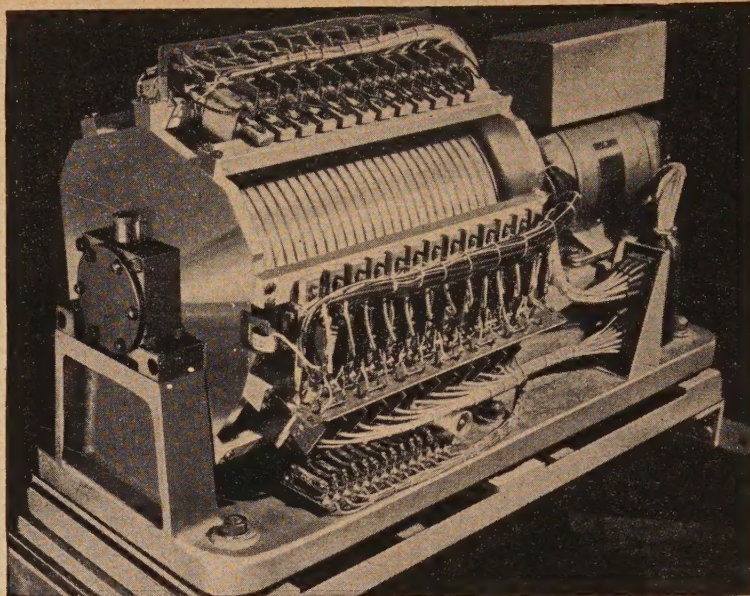
'So these machines,' the visitor asked, 'will not only calculate at fantastic speeds. They have judgment and memory?'

'Once they are instructed,' the Accountant agreed, 'they will combine calculation with memory and they will even make logical decisions.'

'Any moment now you'll be saying they have personality!'

The Accountant shrugged. 'They have some very competitive characteristics,' he said. 'They are extremely flexible. Adaptable and very versatile. The real point is,' he went on emphatically, 'Hec General-Purpose Computers and the new Hollerith Type 555 Electronic Calculators are both ideal for commercial and industrial accounting. Electronic prodigies, I call them.'

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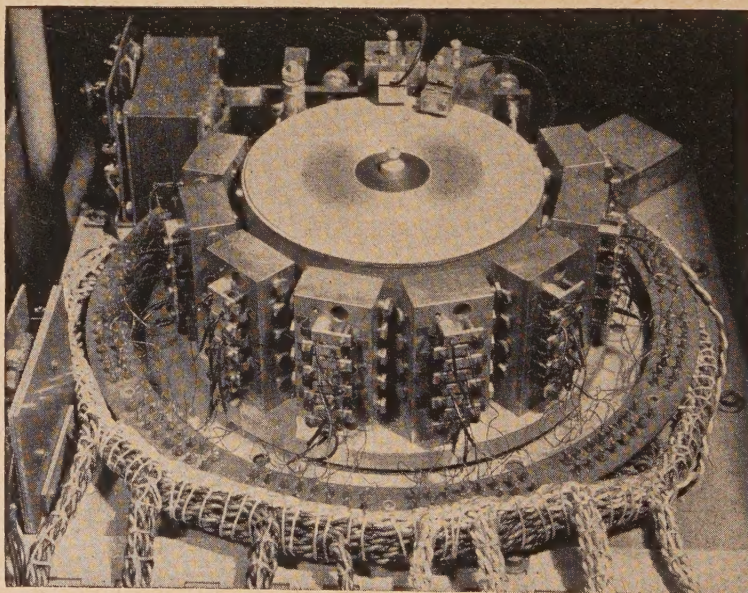
Responsible advice

Do you need either of these electronic prodigies? The way to find out is first to study your own organisation and its needs. Then you would find it rewarding to co-opt the services of Hollerith methods and operations research men, accountants and technicians. Many businesses do this. There is no fee.

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TWELVE YEARS ON

He is a brave man who would forecast even a few years ahead the degree to which our lives will be influenced by computers in industry and commerce. Mr. Leon Bagrit, Deputy Chairman and Managing Director of Elliott-Automation, goes just beyond the next decade in the fourth of the series "Britain in 1970" published recently by the *Financial Times* (10 March 1958).

It is of interest that Mr. Bagrit's article should have appeared closely following the Board of Trade survey (summarised in this issue) of the progress of automation in this country; of the two, Mr. Bagrit's "Growth of Automation" is the more progressive, holding out more hope of such development in the use of nucleonics and automation that the rise in productivity will bring us within sight of Mr. Butler's target of doubling our standard of living. The adoption of electronic devices, he claims, is now proceeding on a scale of geometric progression. "By 1970 the use in this country of large and small electronic 'brains' will have increased to what may now appear to be prodigious proportions. It is impossible to believe that by 1970 there will be many industrial organisations of any size which will not be beginning to do their clerical work by some kind of electronic data processing equipment." This is in addition to the great advances he expects in automation of the process industries and in the introduction of automatic control throughout industry generally.

Only after seven columns underlining the concept that automation will "prove to be the key to the world of plenty which lies in our grasp" is there any note of doubt—the shortage of technicians. Although technical training is receiving increasing attention, the scale is minute in relation to the need. There is already a serious dearth of engineers, physicists and mathematicians. Educational plans announced hardly touch the fringe of the problem.

There is no international monopoly of automation. If we are to meet the challenge of Russia, Germany, Japan and America, if we are to increase our industrial potential relative to other countries in order to survive as a nation, our educational effort must be greater. In 1956 the U.S.A. passed out 26,000 graduate engineers from their universities, the U.S.S.R. 71,000; our total for the same year was 5,000. Each year some 50,000 technicians are trained in the U.S.A. and over a million and a half, it is claimed, in the U.S.S.R.

In the Board of Trade survey the shortage of technicians is also emphasised, but many industries hope to train their own staff in the new techniques. This, however, presupposes that there is a "float" of labour, released by automation, yet also available to introduce it. Where is this bulge to come from? And from where are the makers of electronic devices, with an expanding labour force, to find technicians?

Perhaps Mr. H. G. Knight, general Secretary of the Association of Supervisory Staffs, Executives and

MEMBERS' DIARY

MAY 1958

- 6 LONDON, Northampton College of Advanced Technology, St. John Street, E.C.1, 2.30 p.m.—"Computer Techniques for the Recording of, and Reference to, Data" (Dr. A. S. Douglas, Director of the Electronic Computing Laboratory, Leeds University, and Member of Council).
- 19 LONDON, York Hall, Caxton Hall, Westminster, S.W.1, 6.15 p.m.—"Four Years of Automatic Office Work" (T. R. Thompson, Leo Computers Limited).
- 19 NEWCASTLE—"Applications of a Computer to the Work of Norwich Corporation" (A. J. Barnard, City Treasurer, Norwich).
- 21 LEICESTER (Inaugural Meeting)—"Applications of Computers" (L. Griffiths, Chief Computing Engineer, Rolls Royce Limited).

JUNE 1958

- 4 LONDON, Northampton College of Advanced Technology, St. John Street, E.C.1, 2.30 p.m.—"Some Aspects of the Logical Design of Very Fast Computers" (C. Strachey, National Research Development Corporation).
 - 16 LONDON, Northampton College of Advanced Technology, St. John Street, E.C.1, 5.30 p.m.—Annual General Meeting of The British Computer Society Limited.
- 6.30 p.m.—The Presidential Address (Dr. M. V. Wilkes, F.R.S., Director of the Mathematical Laboratory, Cambridge University).

JULY 1958

- 9 LONDON, Northampton College of Advanced Technology, St. John Street, E.C.1, 5.30 p.m.—Talk by R. H. Gregory, Professor of Accounting, Massachusetts Institute of Technology (title to be announced later).

Technicians, speaking at a week-end conference at Weston-super-Mare, has the answer. Referring to the problem of large-scale redundancies in the aircraft industry, this, he claims, should have been long foreseen; aircraft draughtsmen should be designing electronic computers, aircraft engineers making transfer machines.

Much has been written and said about the new industrial revolution; possibly the concurrent and consequential social revolution has not been recognised. The Minister of Power is to open the Production Exhibition in May. Perhaps he should be accompanied by the Ministers of Education and Labour, so that they may see for themselves the sort of device for which they will have to find and train the designers and operators.

COMPUTER COMMENT

Computers in American Universities

The second issue of the *Communications of the Association for Computing Machinery* (February 1958) lists 27 American universities which have acquired an IBM 650, and a further 10 which have placed an order for the same machine.

Tracking the Sputnik

Viewers watching the BBC Television News on Friday 11 April saw Robin Merson operating the controls of the Ferranti PEGASUS Computer at the Royal Aircraft Establishment, Farnborough. The computer was performing calculations based on observations of the dying orbit of Sputnik II, which finally fell to earth on the following Sunday night.

Faster, Faster

IBM has announced a new version of the IBM 705, known as the 705-III. The new machine embodies a number of changes, all aimed at increasing the effective speed of the system.

The magnetic tape units have been replaced by the transistorised Type 729-III which reads and writes at 60,000 characters per second, four times as fast as its predecessors. By the addition of a new unit called a "Data Synchronizer" the reading or writing can take place at the same time as computation.

New functions have been introduced into the instruction code, and improvements of design have enabled operations to be speeded up and, in some cases, overlapped. This, together with a doubling of the size of the magnetic core store, has increased the internal computing speed.

It is claimed that the new system is two to four times faster than the old at sorting and file maintenance operations.

Personal Tuition

The ideal teacher pays individual attention to each pupil, noting his weaknesses, correcting his faults, and adjusting the difficulty of exercises to match the pupil's growing skill. Too often, it must be admitted, teachers cannot afford the time to give each pupil this attention.

Where the subject being taught is simple, however, such as learning to operate a keyboard, it is not impossible to make a computer perform the role of the teacher. The Solartron Electronic Group has built a special-purpose machine, known as SAKI, for training card punch operators. SAKI gives the trainee exercises to perform, by displaying symbols illuminated by indicator lights. The speed of the display is automatically adjusted to the operator's reaction time, and errors are clearly indicated. When the operator shows a tendency to make a particular type of error, SAKI concentrates on this until the weakness is cured.

SAKI is a development of an earlier machine known as EUCRATES.

Computers in the Cold War

Russia has been devoting much of her most talented mathematicians' efforts to developing new and exciting applications of computers, and may be planning to follow her successes in the satellite sphere with a major advance in automatic computing. So predicts Dr. John W. Carr III, the President of the Association for Computing Machinery, in the March issue of *Computers and Automation* (p. 12).

Dr. Carr bases his warning on a perusal of recent papers published in Russia, and says that the major objective of the Russian efforts is the automatic translation of languages. According to Dr. Carr, the work reported in the Soviet open literature indicates that the theory behind this programme was well developed over two years ago. The calibre of the mathematicians involved and the description of the work done indicates that it is a major project. "On the other hand," writes Dr. Carr, "the overall United States effort in this area has been negligible. What results have been obtained have been generally more in the way of trial experiments performed by isolated individuals than any concentrated effort".

Dr. Carr also plainly hints that the Russian mathematicians are devoting serious efforts towards developing schemes for making machines behave in a highly intelligent fashion. He criticises government circles in America for their scepticism of fundamental science. "Very little money is available for research at universities, where the persons most competent in such problems are located. Responsibility for any effort at all has generally been left to commercial organizations, whose main effort is the sale or rental of equipment."

PCC Crosses the Line

A Powers-Samas Program Controlled Computer has been shipped to Australia for the Colonial Mutual Assurance Company in Melbourne, and is the first production model of this type of machine to be exported.

It is designed to be integrated with an existing punched card installation and will be used for actuarial and bonus calculations.

The Computer Bulletin

The many expressions of appreciation at the new style of *The Computer Bulletin* have greatly encouraged the Honorary Editors and others responsible for its production. Messrs. Unwin Brothers Limited, our printers, have given much technical advice and assistance, which is gratefully acknowledged.

Arrangements have been made for a number of Honorary Associate Editors and Correspondents to provide a news service so that the *Bulletin* may fulfil its function of bringing members a wide survey of events in the computer field, besides being the "house organ" of the Society. We welcome items of interest from readers, and correspondence, criticisms and suggestions.

This issue completes Volume I. The next issue (No. 7, June/July) will contain an index to Volume I, and is expected to be published early in June.

THE CONSTITUTION OF THE SOCIETY

E. Edward Boyles, F.C.A., M.B.I.M.

The British Computer Society Limited is a limited company, but it is not intended to function as a business undertaking. At the same time its constitution is based upon the principles of Company Law as codified by the Companies Act, 1948, and as illustrated by the decisions in numerous cases in the High Courts and as established by secretarial practice.

The main advantages of this constitutional basis are firstly that the Society is a legal entity, irrespective of the identity and transient characteristics of its individual members; secondly, that by virtue of the existence of this separate legal entity the Society is endowed with perpetual succession, subject, of course, to elementary financial considerations; and, thirdly, that a member of the Society is indemnified against liability for any debts incurred by the Society subject to the limit of his or her contractual obligation under the guarantee provision. This guarantee provision involves a liability not exceeding £1 sterling for any necessary contribution towards the debts and liabilities of the Society if and when the Society is wound up.

It is intended by the Council to apply in due time to the Board of Trade for permission under Section 19 of the Companies Act, 1948, to dispense with the word "Limited" as part of its name, but if and when this sanction is obtained the deletion of the word "Limited" from the title will not affect the limitation of liability of the members.

The relationship of the Society to the outside world is governed broadly by the Clauses of the Memorandum of Association which include provisions for the following:

- (1) The name of the Society (which may be varied by consent of the Board of Trade if required, and subject to the passing of certain resolutions).
- (2) The domicile of the Society, which is England.
- (3) The objects for which the Society is established, which may be summarised as the furthering of the development and use of computational machinery and related techniques, the facilitation of the exchange of information and views on the subject and the

informing of public opinion on it, the holding of conferences and meetings and the publication of information for the benefit of members.

- (4) The application of all income and property of the Society towards the promotion of the objects of the Society, thus precluding the payment of any kind of dividend, gift or bonus to members (although proper salaries, etc., may be paid to employees who are not members of the Council).
- (5) The limitation of the liability of members.
- (6) A guarantee by each member of the Society to contribute not more than £1 towards liabilities in the event of winding up.
- (7) The distribution of any surplus assets on winding up for the benefit of some other Institution or Institutions with similar objects.
- (8) The keeping of proper accounts and the submission of audited annual accounts.

The internal regulations of the Society are included in the Articles of Association. Noteworthy amongst these are the clauses dealing with the appointment, constitution and functions of the Council. Members of the Council are in the same position as the directors of any other Company. It would normally be necessary, therefore, for the names of the members of the Council to be shown on all business letters on which the name of the Society appears, but an order has been secured from the Board of Trade exempting the Society from the obligations imposed by Section 201(1) of the Companies Act, 1948, in this regard.

The Council consists broadly of members nominated by specialist and regional groups and members elected by the general body of members. The number of elected members must equal that of the nominated members, always subject to the maintenance of a basic number of council members which at the moment is fourteen. The number of the Council must not exceed thirty-five members.

At this point it should be noted that the whole of the clauses of the Articles of Association are subject to

alteration by the members if required, but such an alteration requires a special resolution (i.e. a resolution passed by a majority of at least three-quarters of members voting at a general meeting of which at least twenty-one days' notice, specifying the intention to propose the resolution as a special resolution, has been duly given).

Retirement of Members of Council

At each Annual General Meeting one-third of the members of the Council, or the nearest number below one-third, retire in rotation and by seniority of service on the Council, and no such member retiring is eligible for re-election until the next following Annual General Meeting unless he has been a member of the Council for less than three consecutive years at the time of his retirement. Retirement between members of equal seniority is settled by lot in such manner as the Council may determine.

The vacancies caused by the retirement of elected members are filled by further election by members, and the vacancies created by the retirement of nominated members are similarly filled by a further nomination by a specialist or regional group.

The Council have an obligation to nominate a candidate for election in place of a retiring elected member, and any other four or more members may nominate a candidate for election in place of a retiring elected member.

Thus the number of vacancies for elected members having been calculated by reference to the Annual General Meeting of any year, the Council must nominate precisely that number of candidates for election. Other candidates may be nominated by members (at least four members nominating each candidate).

If there are more nominations than vacancies a postal ballot has to be taken not more than one month before the meeting, the result of the ballot being deemed to be a resolution of the general meeting; but if there are not more nominations than vacancies then the election takes place at the general meeting itself.

If a specialist or regional group nominates, as its member of Council, somebody who is already an elected member of the Council, this creates a further vacancy, because the member who was originally an elected member creates a vacancy by retiring from this status to become a nominated member, and it is therefore necessary to fill the vacancy amongst the elected members by electing a fresh member of the Council.

Before dealing further with the constitution of the Council it may be well to consider a broad outline of the provisions in the regulations which relate to membership of the Society.

Membership

Admission to membership of the Society is subject to the approval of Council, the first members being the subscribers to the Memorandum of Association. In view of the guarantee provision, a member must sign a written consent to become a member. The classes of members at present provided for by the Articles are as follows:

Ordinary Members.
Associate Members.
Institutional Members.
Honorary Members.

Ordinary Members

Ordinary Members must have given such evidence as the Council may require of their interest in the development and use of computational machinery and techniques related thereto or must have attained the age of twenty-five whilst already being Associate Members.

An application for admission as an Ordinary Member must be supported in writing by two sponsors each of whom must be an Ordinary Member of the Society.

Associate Members

Associate Members are persons who have attained the age of twenty-one years, and are otherwise eligible to become Ordinary Members, but are still not twenty-five on the first day of May last preceding their application for membership, and they will be eligible to remain as Associate Members until the first day of May next following the day on which they become twenty-five.

They must be sponsored in the same way as Ordinary Members.

Institutional Members

Institutional Members are corporate bodies who have given such evidence as the Council require of their interest in the development and use of computational machinery and techniques related thereto.

Honorary Members

Any person may be elected an Honorary Member, even if such person may not be eligible as an Ordinary Member or an Associate Member, if a resolution electing him is passed at a meeting of the Council at which at least two-thirds of the Members of Council are present, provided that the resolution is passed by at least three-fourths of the Members of the Council present at the meeting.

It should be noted the Council may in its absolute discretion refuse to admit any person to membership, and need give no reason for doing so.

All members are entitled to receive notice of General Meetings and to attend such meetings, and to participate equally in the facilities provided by the Society, including the right to receive information and literature (subject to any charge fixed by the Council), but only an Ordinary Member may be elected as a member of the

Council, or vote at a General Meeting, and an Institutional Member cannot participate in any facilities offered to members except the right to receive information and literature on the same terms as other classes of members and to nominate representatives to participate in such activities of the Society and in such manner as the Council may decide.

The Council may vary the qualifications by a resolution passed by the vote of, or assented to in writing by, at least two-thirds of the members of the Council.

A member may be expelled by resolution of the Council subject to the following conditions:—

- (1) He must either have failed to pay his annual subscription for more than four months after its due date, have become bankrupt or entered into an arrangement or composition with his creditors (or, in the case of an Institutional Member, have wound up otherwise than for reconstruction or amalgamation purposes), or have been guilty of conduct which the Council decide by resolution to have been such as to render him unfit to retain his membership.
- (2) The expulsion resolution must be passed at a Council Meeting duly convened with notice of intention to consider the case, at which at least one-third of the members of the Council are present.
- (3) If the reason for expulsion of a member is *other than* conviction for an indictable offence, failure to pay his annual subscription, or insolvency procedure, he must be given at least fourteen days' notice of the proposed expulsion and must also be given an opportunity of being heard, either in person or through an advocate, in his (or its) own defence at a meeting of the Council specially convened for that purpose.

The Council has power to re-admit an expelled member at any time and upon such conditions as it may determine.

The Council have power to settle the amount of entrance fees and/or subscriptions. Subscriptions are payable on the first day of May in each year unless the Council decide otherwise.

General Meetings

The Society must hold an Annual General Meeting in every calendar year, not more than fifteen months after the last Annual General Meeting, at a time and place to be decided by the Council. All other General Meetings are to be called Extraordinary General Meetings.

An Extraordinary General Meeting may be called at any time by the Council or by the requisition of the members of the Society representing at least one-tenth of the total voting rights of all the members entitled to vote at the date of the requisition.

Every Ordinary Member has one vote, unless his subscription is unpaid and more than four months in arrear. Proxies are not permitted.

Groups and Branches

The Council may at any time approve of the establishment of a specialist or local Group or a specialist or local Branch anywhere, and may make appropriate regulations as to the conduct of the affairs of the Group or Branch.

But whereas an approved Group has the right to nominate one Ordinary Member as a member of the Council, an approved Branch has no right to nominate a member of the Council.

Council of Management

No person can in any circumstances be eligible to hold office as a member of the Council unless he is an Ordinary Member of the Society.

Before any member (other than a retiring member of the Council who has served for less than three consecutive years) can be eligible for election to the Council, he must either have been nominated by the Council or have been nominated by written notice addressed to the Secretary and signed by at least four Ordinary Members (whose current subscriptions have been paid), and accompanied by the written consent of the member to accept nomination. An Ordinary Member can support the nomination of only one candidate for election. The notice must reach the Society at least seven, but not more than fourteen, days before the day on which the voting papers are to be issued for a postal ballot.

The postal ballot must be taken not more than one month before the General Meeting.

The members of the Society in General Meeting may prescribe regulations as to powers of the Council, subject always to the existing provisions in the Articles of Association. Subject to such regulations, and to any statutory regulations which may affect the Society, the business of the Society is managed by the Council, who elect their Chairman from amongst their number. The Council appoints or removes the Secretary and settles his remuneration and terms of service, and may similarly appoint or remove a Deputy Secretary and/or Assistant Secretary.

A member of the Council is deemed to have vacated office under any of the following circumstances:

- (1) If he ceases to be an Ordinary Member of the Society.
- (2) If he resigns in writing.
- (3) If he becomes of unsound mind.

- (4) If he makes an arrangement with his creditors or becomes the subject of a receiving order.
- (5) If he is removed by the Members in General Meeting.
- (6) If he is removed by a resolution of the Council after he has absented himself from five consecutive meetings of the Council without special leave of absence.

The members of the Society could remove a member of the Council by resolution at a General Meeting, and might similarly appoint a new member in his stead. The new member would hold office until the next Annual General Meeting when he would become eligible for re-election, and he would not be counted in settling the number of Council members to retire by rotation at that Annual General Meeting.

Subject to the maximum number of thirty-five members of the Council, the Council may at any time co-opt an Ordinary Member of the Society to be a member of the Council, either to fill a casual vacancy or as an additional member, and such a co-opted member retires at the next Annual General Meeting and is then eligible for re-election. He is not counted in determining the number of Council members to retire by rotation at that meeting.

If the number of Council members falls below fourteen, the continuing members may act as a Council to fill any vacancies or to summon a General Meeting, but not for any other purpose.

The Council has absolute power to appoint Committees of the Council and to regulate their procedure, and may also appoint to such Committees persons with specialised knowledge or experience whether from among members of the Society or not. The Council may similarly dissolve any Committee at any time.

Presidents and Vice-Presidents

The Council appoints the President from among their members or from among the Ordinary Members or Honorary Members of the Society. The term of office of the President may not exceed two years, and during that term he is an *ex-officio* member of the Council.

The Council may also appoint a Vice-President or Vice-Presidents from the members of the Society, but a Vice-President is *not* a member of the Council by virtue of his appointment to the office. He may be a member of Council by election or nomination. There is no time limit to his term of office unless the Council resolution appointing him specifies such a time limit, and in the absence of such a time limit in the appointing resolution he continues to hold office until he either resigns in writing or ceases to be a member of the Society.

COMING EVENTS

Cambridge Summer School

A Summer School in program design for automatic digital computing machines will be held in Cambridge from 15 to 26 September 1958. Organised by the University Mathematical Laboratory in co-operation with the Board of Extra-Mural Studies, the course will be along similar lines to those held in previous years, but the material has been revised and students will have access to EDSAC 2.

The subject will be treated from the point of view of the user and, from an early stage, emphasis will be laid on practice in program design and the actual running of programs on the machine; a study will also be made of the problems encountered in designing programs for other machines. As the course is intended to provide basic training for those who are entering the field, there will be a brief survey of the techniques used in numerical analysis and a discussion of the problems met with when automatic machines are used.

It is necessary to limit the size of the school and it may not be possible to enrol all those who wish to attend. Further details and an application form may be obtained from the Secretary of the Board of Extra-Mural Studies, G. F. Hickson, M.A., Stuart House, Mill Lane, Cambridge.

Imperial College Colloquia

Two further meetings have been announced in the series of Colloquia on Numerical Analysis and Machine Computation held by the Imperial College of Science and Technology. They will take place in the City and Guilds College, Exhibition Road, South Kensington, London, S.W.7.

Wednesday 21 May, at 3 p.m.

"Generation of Pseudo-Random Numbers on Electronic Digital Computers", by Dr. A. R. Edmonds, University of London Computational Unit.

Wednesday 18 June, at 3 p.m.

"The Iterative Method for Solving Eigenvalue Problems," by Mr. H. J. Norton, Mathematics Division, National Physical Laboratory.

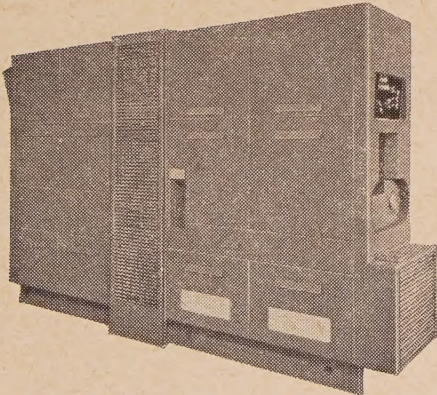
Univac Computer Division

From 1 April 1958 the Electronics Division of Remington Rand Limited will be renamed the "Univac Computer Division", and will be moving from Commonwealth House to Univac Computer Division, Remington Rand Limited, 26 Kensington High Street, London, W.8. (Telephone: Western 8241.)

Mr. C. W. Elliott will be National Sales Manager of the newly formed Business Services Division, which will include the Univac Computer Division and the Organisation and Methods Services Department.



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AUTOMATION IN BRITISH INDUSTRY

The Board of Trade has published (*Board of Trade Journal*, 14 February) its findings following the inquiry last year into the progress of automation techniques and the prospects of the necessary equipment being available.

For the purpose of the inquiry, the definition of automation used was that given in the 1956 DSIR Report, covering the three fields of transfer machines or automatic production lines, automatic control over manufacturing processes, and electronic data processing techniques in office work. Addressed to both manufacturers and users of automatic equipment, the inquiry covered a wide range of industry, trade associations and large employers of clerical labour. There was, however, some difficulty in analysing the replies because the questions were not always interpreted in the same way, the amount of information and detail given was not related to the economic importance of the industry concerned, and trade associations did not always indicate the proportion of the industry to which their comments applied. The questions had to be phrased in general form, and therefore no precise figures were obtainable from the replies.

* * *

The general picture given by the report is that a big increase in the adoption of automatic techniques is expected over the next four or five years. Many of the plans for this extension of automation are for the introduction of new equipment; with the extension of existing automatic handling equipment, automation in some form will be operating over almost the whole range of industry and the distributive trades, particularly where large numbers of individual units are dealt with or where large quantities of raw materials are used. But the evidence suggests that, while production of standard types of automatic handling equipment is well advanced, design and development of advanced types of specialised equipment has often proved difficult.

The inquiry revealed many planned applications of transfer machines. Computer controlled machine tools, on the other hand, are only used to any extent in the air frame and aero engine industries, and limited applications are expected only in the manufacture of precision instruments and engineering capital goods such as large electrical generators, pumping plant and hydraulic turbines.

* * *

In the section of the report dealing with the use of computers for electronic data processing, many industrial users expect to employ the machines mainly for routine clerical work and accounting procedures; some firms expect to apply them to more advanced techniques such as production planning and stock control. Nearly all the major employers of clerical staff expect to be using

digital computers within the next five years; the inquiry covered the distributive trades, banks, insurance companies, hospital boards, and central and local government. In industry, expected users include iron and steel firms, oil companies, nationalised industries, aircraft constructors, electrical engineers, scientific instrument makers, cable makers, pump manufacturers, cycle and motor-cycle manufacturers, excavator makers and bearings manufacturers.

The evidence suggests that it is the larger firms who are at present interested in the use of automatic equipment in the office; the price range of an electronic data processing installation is quoted as being from £35,000 to £500,000. It is claimed by one equipment manufacturer that an installation costing £100,000 is economic for any undertaking with a clerical staff of 400 or more, providing their activities can be centralised. For smaller concerns, there is a suggestion in the report that several undertakings in the same area may combine to buy or rent a computer collectively.

Ancillary equipment for electronic digital computers is not as technically advanced as the computers themselves, and the main difficulties expected in obtaining EDP installations are in getting specialised ancillary equipment.

The use of analogue computers is limited to the aircraft industry and to a few cases in the engineering industry. Analogue computers to control the operation of power stations and the distribution of electricity might be expected in the next five years.

* * *

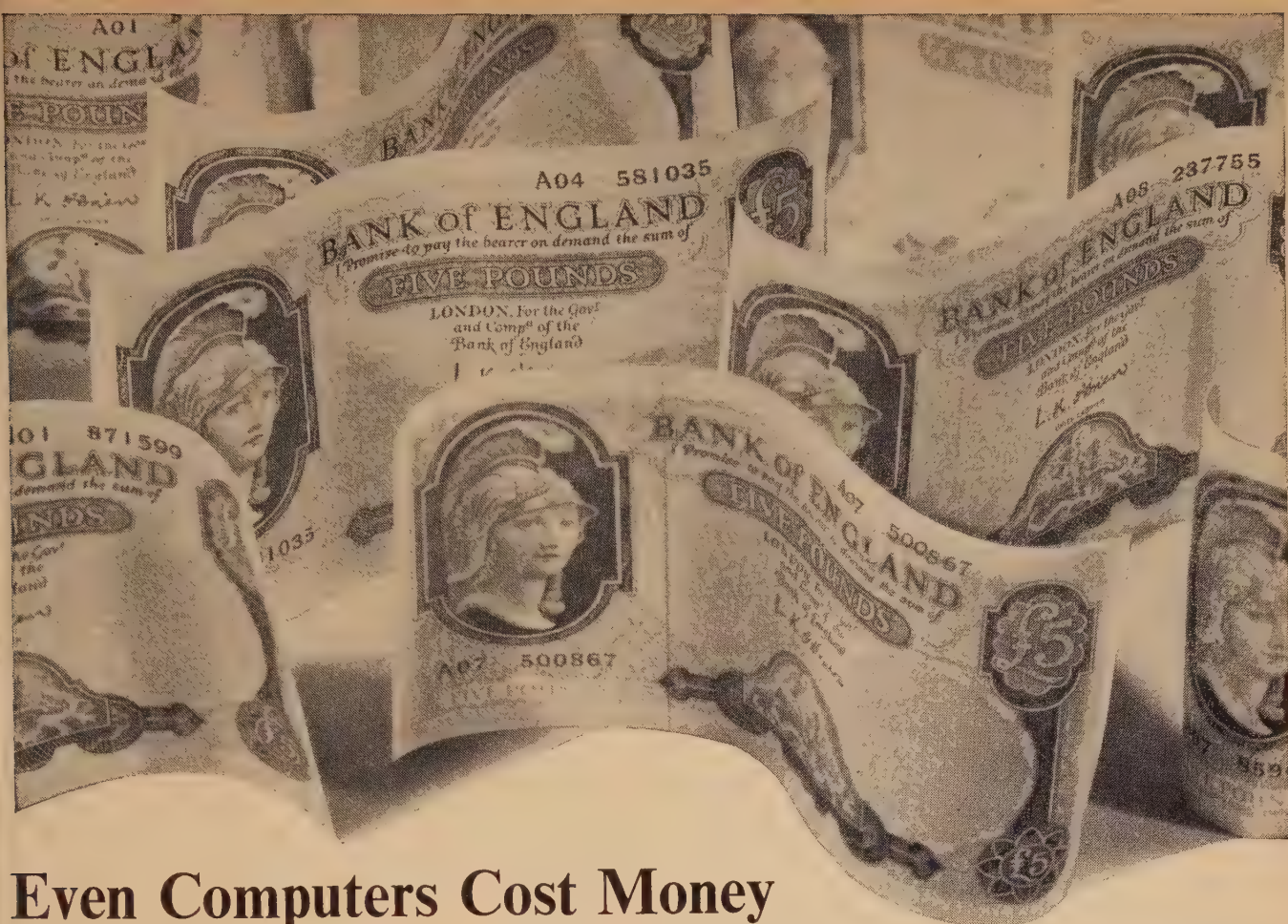
The main reasons given in the report for the adoption of automatic techniques for production purposes are reduced costs and increased output. In some cases, lower unit cost may be achieved by increased output, in others, by reducing the labour content. Costs will also be reduced, it is expected, by more efficient control and use of raw materials, and by reducing the capital investment in materials and stocks.

Other reasons given are to overcome labour shortages, to meet overseas competition, to improve the quality and consistency of the product, and to be able to handle the quantities involved in the large process industries.

In the clerical field, the reasons for adopting EDP are given as the increased speed and accuracy obtainable, some reduction in labour costs, and in part to overcome a shortage of clerical labour.

* * *

Most automatic equipment for industrial needs is obtainable in this country although many specialised items have to be obtained abroad; the need for this, however, is lessening as equipment is beginning to be manufactured here under licence. Almost all intending



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users of EDP equipment expect to be able to obtain what they require in this country, although similarly they may have to look elsewhere for certain items of specialised ancillary equipment. Dates of delivery of computers are usually long (from one to three years), but this is not unreasonable related to the delay usually unavoidable in adapting office methods to their use.

Manufacturers of equipment, however, expect that production may be hindered by the shortage of technical staff. The commonest complaints, says the report, "were of the shortage of design technicians and of engineers trained in electronics and servo-mechanisms". And again: "Common complaints of the manufacturers of control equipment were the shortages of technical manpower of all descriptions for design, production and maintenance."

Users of EDP equipment voice similar doubts: "Both industrial and non-industrial undertakings expected to find difficulty in recruiting technicians for electronic data processing equipment. There was almost universal agreement that there will be a grave shortage of programmers."

* * *

Many firms expect that further introduction of advanced mechanisation, especially when of a specialised nature, will increase capital costs; few firms, however, expect to find it difficult to provide capital for present plans. In many cases, some re-equipment has to be undertaken in any case, and provision has already been made for this; indeed, adoption of automatic equipment may on occasion reduce capital expenditure by making it unnecessary to replace some expensive and cumbersome plant.

In the office field, there was varied opinion as to the effect on capital expenditure. Non-industrial users such as the banks expect that the proportion of capital investment will not be large in relation to their total costs; industrial firms already "conventionally" mechanised expect to absorb much of the computer cost in what would otherwise be spent on replacing existing equipment; only firms with little experience of office mechanisation expect to find the introduction of a computer expensive.

* * *

It is not yet possible to assess the effect that the introduction of more advanced automation will have on the size of the labour force. The inquiry revealed that while some firms expect to make reductions, others expect an increase to keep pace with expanding production; a few expect to maintain their present labour force with increased output. But generally it is anticipated that there will be fewer unskilled labourers and more skilled technicians.

In office automation it is expected that there will be considerable savings in the least skilled clerical labour. The overall level of skill will be higher; senior staff will have more responsibility. A new class of technologist, the programmer, will be employed. In some cases shift

UNIVERSITY COMPUTERS

Lucifer Goes to Chapel

The Leeds University Computing Installation (Ferranti)—abbreviated to LUCIFER—started working towards the end of 1957 and is now in regular operation. This satanically named device is perhaps inappropriately housed in the previous Eldon Hall Chapel, but it must be admitted that the original gallery provides an excellent grandstand from which to look down on what can only be described as "the computer hall." Visitors can be kept away from the machine, and yet see the whole installation below them. Executive offices, programming rooms and other departments are housed in modernistic rooms in the side aisles.

Dr. A. S. Douglas, director of the University's Electronic Computing Laboratory, admits to a few teething troubles, but has now ironed out installation difficulties of this modern machine in unusual surroundings. The aircraft industry and organisations such as I.C.I. have hired time already, and courses have been started to train potential users. It is intended to demonstrate the potentialities of the installation on problems of stock and production control, while Professor S. E. Toulmin, Professor of Philosophy at the University, hopes to use the machine to pioneer a system of searching library catalogues.

* * *

Sheffield and Steel

United Steel Companies Limited and Sheffield University jointly manage Sheffield's new computer, another Ferranti PEGASUS. Housed at United Steel's department of operational research and cybernetics, the installation is under the joint direction of Mr. Philip Blundell, Director of Sheffield University Computation Laboratory, and Mr. David Owen, Computer Applications Manager of United Steel Companies Limited. It will be used by research workers and for training in computer techniques.

work will have to be introduced for the computer to be economic.

Many large firms expect to have to train their own operatives and maintenance staff for control systems of all types, although in some cases they expect assistance from the manufacturers of the equipment.

Only one firm mentioned the need to educate the senior staff and management who will be responsible for the work of the computer.

SOCIETY AND COUNCIL NOTES

British Computer Society Conference

The Council of the Society has announced that the 1st British Computer Society Conference will be held in Cambridge from 22 to 25 June 1959. The conference will cover a wide variety of subjects, and cater for both initiated and uninitiated users (and potential users).

The programme is being drawn up by a small committee headed by the President and is expected to include a report on the proposed UNESCO Conference on Information Processing earlier in June. The conference will be residential; provisional accommodation has been reserved for about 500 delegates in colleges and hotels.

* * *

American Visitors

Two additional meetings are being arranged in London this summer to be addressed by distinguished visitors from the United States.

The first will be on 9 July at 5.30 p.m., at the Northampton College of Advanced Technology. Professor R. H. Gregory of the School of Industrial Management, Massachusetts Institute of Technology, will speak on a subject arising from a thorough study which he has made of some business computer installations in the U.S.A. The exact title of his talk will be announced later.

Dr. John W. Carr III, the President of the Association for Computing Machinery, will also be visiting this country, and it is hoped to arrange a meeting to be addressed by him on the subject of "The Theory and Practices of Automatic Programming in the United States." The date of this meeting has been provisionally fixed for 1 August at 2.30 p.m., and members are recommended to reserve this date. A further notice will be issued later.

* * *

Regional Branches

Council has given formal approval to the formation of the following Regional Branches—

Leeds—15 January
Newcastle and District—23 January
Hull and East Riding—12 March
Cardiff and District—1 April
Sheffield—3 April.

The inaugural meeting of the proposed Leicester Branch is being held on 21 April. Branches are expected to be formed shortly in Nottingham and Plymouth.

Council Elections

At the time of going to press, nominations are being received for election to Council and to the Specialist Group Committees. If more nominations are received than there are vacancies, and elections are necessary, members will have received ballot papers prior to publication of this issue.

Members are reminded that ballot papers must be returned to the Scrutineer not later than 19 May.

The result of the election, and the composition of Council and the Specialist Group Committees for 1958–59, will be announced at the Annual General Meeting. This will be held on Monday, 16 June 1958, at the Northampton College of Advanced Technology, at 5.30 p.m., to be followed by the Presidential Address.

* * *

Analogue Computers

A small committee is being set up under the auspices of the Scientific and Engineering Group to cater for analogue computing interests within the Society. Members with an interest in this field are asked to advise the Secretary of the Society so that this committee, when formed, may have some idea of the numbers involved and the types of application concerned.

* * *

Study Group Reports

The Study Groups of the Business Group have now completed their work for the 1957–58 session and their reports are now being compiled. It is intended to publish précis of these in the June/July issue of *The Computer Bulletin*, if the Study Group Sub-Committee have been able to complete this onerous work in time. The August/September issue will carry a full report of the Annual General Meeting and the arrangements made for 1958–59 sessional activities.

* * *

Resignation of Secretary

Members will be sorry to learn that the Society's Secretary, Mr. W. E. Reed, has found it necessary to resign owing to personal circumstances involving residence away from London. He hopes to be able to continue until the end of the Society's year, 30 April 1958.

LONDON MEETINGS

Mental Arithmetic

A large gathering of members was present at the Caxton Hall on 17 February to hear Professor A. C. Aitken demonstrate his incredible and fascinating ability in mental arithmetic. Terming his talk "an historical review with demonstrations", Professor Aitken spoke of the methods he used in very rapid mental calculations. He stressed the importance of making a firm decision as to the method to be employed in any particular calculation before starting the process; to hesitate is to lose all.

Operating on questions posed by the audience, and previously unknown to him, Professor Aitken showed his rapidity in solving such calculations as square roots, squares of 2, 3 and 4 digit numbers, reciprocals and other arithmetic functions. Particularly impressive was his recognition of prime numbers. Finally, as what might be termed the encore to his masterly performance, he evaluated π to one thousand decimal places—a truly remarkable *tour de force*.

His demonstrations were interspersed with many delightful personal anecdotes which removed any suspicion that here was an inhuman calculator. His talent extends to languages; he has mastered all the tongues of Europe with the exception of the Slavonic group. Admitting that his facility for rapid mental arithmetic was partly inherited, he told of his study and memory training to develop it.

A questioner, attempting to find some comparison with other types of storage, wondered if the Professor had any idea of the mental capacity of his mind at any one time, or the amount of information stored therein. Professor Aitken had not; he felt that this was more a question for the psychologist.

Boots The Chemists

On 17 March Mr. D. S. Greensmith spoke to members in the Caxton Hall on the progress being made in the introduction of electronic data processing to the work of Boots Pure Drug Co. Ltd. His talk was very fully illustrated with confidential data relating to the company, and it is not possible to reproduce his paper in full. It is hoped, however, to publish a condensed report in a future issue of *The Computer Bulletin*.

Scientific and Engineering Group

A number of additional meetings for members of the Society have been arranged during the first few months of this year by the Scientific and Engineering Group. Intended in the main to deal with technical matters, the audiences of 60 to 100 have included a surprisingly large number of Business Group members; the lure of the possibility of picking up more, and often new, information attracts larger numbers than expected.

The February meeting, when Dr. K. D. Tocher spoke on the use of computers in operational research and cybernetics, was followed in March by a well-attended meeting to hear Mr. R. J. Froggatt of EMI Electronics discourse on core-logic and outline the design and construction of EMIDEC.

Details have been circulated to members of the programme for the symposium on the mechanical translation of languages in April, and the May paper, the sixth in this present series, will be given by Dr. A. S. Douglas on computer techniques for the recording of, and reference to, data.

These informal meetings, with the opportunity for discussion, have proved to be most successful; it is hoped that a similar series will be arranged for next session.

PRODUCTION EXHIBITION AND CONFERENCE

The 1958 Production Exhibition will be held in the Grand Hall, Olympia, from 12 to 21 May. At the same time the Conference of the Institution of Production Engineers will be held in the exhibition building, on the theme "Production Fights Inflation".

To be opened by the Minister of Power, Lord Mills, the following six sessions will cover several matters of particular interest to those active in the computer field:

"Selling in World Markets"

"The Economic Background" (Professor F. W. Paish).

"Cybernetics" (Dr. F. H. George and John Harling)

"Designing Machines for Electronic Control" (Dr. F. Koenigsberger)

"Automatic Equipment for Jobbing Work" (three authors to present case studies)

"Human Relations—The E. W. Hancock paper" (Lewis Wright).

Further details of the conference and an application form for tickets may be obtained from the Conference Secretary, Institution of Production Engineers, 10 Chesterfield Street, London, W.1.

REGIONAL NEWS

Cardiff

The inaugural meeting of the Cardiff and District Branch was held on 1 April at University College, when some 80 people heard the Chairman of Council, Mr. D. W. Hooper, give an address on "Some Problems of Electronic Data Processing". Dr. D. Rogers, Senior Lecturer in Physics at the University, was in the Chair.

Introducing the speaker, Dr. Rogers said: "Just ten years ago, in 1948, the first two experimental electronic general purpose digital computers were under construction in University Laboratories in this country, at Manchester and at Cambridge. The size of our gathering this evening indicates the interest that has very swiftly grown out of those first two computers and represents a very marked and rapid development of an entirely new technique; I think it is probably true to say that few things have come out of purely academic context and have been seized upon industrially, in quite so short a time.

"I grant that the needs of defence, the aircraft industry, and so on, have helped the initial development of these machines, and of the techniques associated with them, but more recently still they have emerged, fully fledged, as great aids in the business world. This has meant that a wide variety of interests are centred on these machines." After outlining the way in which the Society had been formed from the desire of these interests to find a common ground for discussion and the exchange of information, he went on: "Apart from those who are present here this evening we have had a number of apologies for absence, so that it is quite clear that there is a large potential interest in this area. It is a diverse one, from business and engineering (both in engineering calculation and in the manufacture of computers) to a few like ourselves with academic problems that we require to put on computers."

In his address, Mr. Hooper ranged over a variety of difficulties which were likely to be encountered in practice when one started to instal and operate an electronic data processing system. Dividing these problems into those resulting from shortcomings of the equipment and those due to inefficient use of machines and techniques of organising them, he stressed that "computers have more problems than us—after all, computers have to put up with us".

Mr. Hooper's address is being reproduced in *The Accountant*.

* * *

Glasgow

Members of the Glasgow Branch met on 10 February to make their personal contributions to plans for future activities. This "domestic" meeting proved to be a

lively and constructive evening, the discussion being concerned mostly with the organisation of study groups for next session.

It was agreed that small groups would be started, both by subject and on a geographical basis (such as in Edinburgh and Kilmarnock), meeting on an informal basis, but keeping a report of their deliberations and conclusions. The groups would be composed of members at various stages of knowledge, and whenever possible would include some with experience whose expert knowledge could thereby be made available to the others.

The subjects most favoured for initial study were

- Making the feasibility study
- Selecting suitable equipment
- Training and personnel problems
- Programming
- Input/output techniques and problems
- Production control
- The computer and the auditor
- A range of specific applications, such as sales accounting, payroll, stock control, and engineering problems.

There are more than eighty members already, and it was felt that the study groups would be able to start in October with an adequate number of members in each; evidence of the interest in such discussion was shown by the tendency of many of those present to get down to detailed discussion of the subjects during the meeting.

Later in the month, on 24 February, Dr. S. Gill (Ferranti Ltd., and a Member of Council) spoke on "Parallel Programming", outlining new developments in programming techniques.

On 17 March Mr. P. V. Ellis (Powers-Samas Accounting Machines Limited) addressed the Branch on the interpretation and use of historical statistics to forecast future trends in stock control applications. He examined in some detail the analysis of past records, using demand and replenishment time as examples, and showed how this information could be used to determine the most efficient stock level—one that would achieve a proper balance between unsatisfied customers on the one hand and excessive stocks on the other.

Mr. Ellis showed how to construct a model which would give a complete simulation of demand, replenishment or any other variable factor, and went on to outline the application of a computer to this data. He stressed the need for speed if the information was to be effective, and this, coupled with the volume of data to be handled, might mean that a fairly large machine would be needed. However, the potential savings were likely to be great, both in stock reduction and in the goodwill created by prompt delivery.

Hull

Nearly 150 people attended the inaugural meeting of the Hull Branch on 12 March; they included representatives of many firms in Hull and East Riding, with local government officials and others.

The guest speaker was Mr. A. J. Barnard, City Treasurer of Norwich. Describing how the rates system at Norwich was handled by a computer, he went on to deal with some of the difficulties they had encountered during installation, and the need for careful planning. "I have no doubt at all that electronics are going to revolutionise bookkeeping," he said, "but it is how you use the machine that is the important thing." The full paper, given in London in November of last year, is published in *The Computer Journal* (April).

Mr. P. J. Lown was elected Chairman of the Branch, with Dr. D. A. King as Vice-Chairman and Mr. J. D. Swinscoe as Honorary Secretary.

* * *

Manchester

Two well-attended meetings are reported from Manchester. Held in the College of Science and Technology, the first, on 25 February, was addressed by Mr. A. J. Barnard (City Treasurer, Norwich), who described the application of a computer to the work of Norwich Corporation and the plans for its future use (a paper on this subject is reproduced in the April issue of *The Computer Journal*).

On 11 March Mr. D. W. Hooper (Chairman of Council) spoke on "Integrated Electronic Data Processing". Stressing that the full benefit of a computer in business applications would come only from its use over the whole range of clerical processes integrated into one system, he examined some of the difficulties in achieving this ideal. These could be broadly grouped into those of organisation, equipment available, and staffing and control.

At both meetings time was allowed for question and discussion; these ranged over a wide variety of topics, and showed the many interests covered by members of the Branch.

* * *

Newcastle

The Newcastle and District Branch have formed two main study groups. For the rest of this season, the Commercial group is surveying the available computers and ancillary equipment and then intend to split into sub-groups for specific studies next session. They commenced activity in February with a visit to the University's PEGASUS machine, followed by a general discussion.

The Scientific group held a meeting in February to discuss engineering problems and their application to computers.

BOOK REVIEW

Automatic Computers:

A Systems Approach for Business

by Ned Chapin, 1957. (London, van Nostrand.)—51s. 0d.

Too many books and lectures on computers aimed at a business audience talk around important issues without ever confronting them, particularly if these issues concern finance. Perhaps authors feel a certain reticence in mentioning such sordid topics in the context of so puissant a creation of science! Fortunately the basic financial issues regarding computers and their installation are not avoided in this book, although they are mostly drowned in the flow of words. (Does anyone suppose businessmen cherish verbosity any more than scientists really relish the stark presentation of fact?) The verbosity is sometimes ingenuously cloaked under a semblance of scientific conciseness—I was fascinated, for instance, to arrive at the third alternative in the eighth approach to a subject after some 23 pages of text. Furthermore, most of it seems to be aimed at preparing us by propaganda to accept possibly unpalatable conclusions, rather than justifying and weighing the conclusions themselves. So great is the weight of words that it will be forgivable if the casual observer fails to distinguish the conclusions at all (even when they are italicised!) or, indeed, since the book runs to over 500 pages, the more serious student fails to stay the course. Yet this would be in some measure a pity, for the conclusions presented appear to me for the most part to be sound, whilst Appendices C and D give a comprehensive survey of computing and card machines available in the U.S.A. in 1956. Indeed, taken with issue No. 3 of *The Computer Bulletin*, a fairly comprehensive picture can be constructed of those computers commercially available at this time.

Perhaps the conclusions of most immediate interest to us here are on matters such as depreciation and reliability. On the former subject the author states "the informed opinion of specialists in the field puts the estimated service life, including an allowance for obsolescence, at more than ten years", a conclusion with which I concur, although, as he rightly points out, it may be better commercial practice to write off the cost over a lesser period, as is commonly done. On reliability he writes: "As a very rough measure of automatic computer reliability, consider that if a good clerk were assigned full time to copying numbers rapidly without checking his own work, and that if during one full year of work he were to make only one minor, and easily found error (such as writing a nine instead of a dollar sign in a total), he would probably still be significantly more unreliable than a good automatic computer. Comparatively speaking, therefore, although the automatic computer cannot completely avoid errors, it is much more error-free than are the available alternatives."

However, his detailed discussion, in chapter 17, of this subject leaves one vital aspect undiscussed. He has correctly noted the important relation between adequate servicing and reliability, and the fact that the input and output, being mechanical, are liable to more frequent failure than the electronic parts. However, average figures for failure such as he gives are apt to be most misleading, since such "occasional" failures are not significant, even in real time operation. The major difficulty is the liability of computers to faults, the detection and repair of which may last for considerable periods, during which time *nothing at all* is being processed. The more comprehensive the grip of the computer upon the firm's operations, the more serious such a failure becomes. On this subject he is silent, perhaps deliberately. Nevertheless, the possibility must be faced and its consequences in planning evaluated.

Various methods of circumventing the difficulty come to mind. Fortunately, most systems do not have to work to so tight a schedule that some allowance cannot be made for failure, and even where they do, as in payroll applications, it is usually possible to use alternative equipment in the area or, in dire emergency, to pay on last week's payroll as a temporary measure. Where the computer is merely recording transactions for future reference or for analysis, a stoppage of the computer will not normally affect the transactions themselves and the computer can make up for lost time later.

In so far as a division of the book can be made, it is in two parts—business considerations up to Chapter 12 and technical considerations thereafter. Whilst, in the main, I agree with his conclusions on how a computer should be installed, costed and justified, even if I do not always agree with his arguments in support of the conclusions, I am far less happy about the technical part of the book. Indeed I find it hard to understand why the technical parts of Chapters 13 and 16 are there at all. If the author really feels that the control circuitry is "complex and uncanny" (p. 354), might it not be better to leave its explanation to those who do not feel it is either? If he does not find it beyond his reach, is it desirable to wrap it in mystery? I think not. Nor do I approve of the emphasis on binary and octal systems introduced into the description of the arithmetic unit.

As regards programming, he has evidently adopted without question the approach by detailed block diagram, prepared by an analyst or senior programmer, followed by coding, done by a junior programmer. This method gives the junior programmer almost nothing to do except a language translation, which a well-trained analyst could do just as well at the stage of preparing the block diagram, and which machines with a good basic code or a fast autocode might render unnecessary.

Furthermore, if the block diagram is not made in sufficient detail, the scheme may fall down due to some detail having been overlooked which makes that form of blocking invalid; at the very least there will be some inefficiency. So insistent an advocate of the integrated approach to computer installation might have been expected to consider whether an integrated approach to programming might not also be desirable,

or, at the least, to have discussed the practical reasons why it has not always proved possible.

Nor do I find his views on the advantages of punched card input convincing. They seem to be based on a belief that sorting in a computer must necessarily be inefficient—a view which possibly springs from the evident incompleteness of his treatment of techniques, given at the end of Chapter 7. I do not agree wholeheartedly with his other views on punched cards, and find his detailed discussion of sorting unsatisfactory in that no proper comparison of the methods proposed is given in terms of various distributions of the keys used for sorting. However, he redeems himself to some extent by his advocacy of avoiding sorting where possible.

It seems slightly inappropriate that we should come to History about half-way through the book. In an attempt at completeness we are taken back to the knotted string, invented apparently at an unknown date wrapped in the mists of antiquity (did they really have string all that long ago?); I am surprised that the efforts of the Egyptians at trigonometry are left out. But the table and the text do less than justice to the facts in many more recent cases. Not only has the author failed to appreciate the completeness with which Babbage and his collaborators had developed the idea of an automatic computer in 1830, but the true significance of the Burks-Von Neumann-Goldstine reports of 1946 is entirely missed. Most designers of computers would, I think, agree that no major advance in logical design has been made since those reports. Changes in emphasis upon various factors have naturally occurred due to changing materials with altered speeds of operation and other characteristics. Yet these are detailed adjustments to the original concept of a stored-program, binary machine originated by those authors. For this reason alone the year 1946 ought not to have been missed from the chronology, as it has been.

If the truly fundamental steps in computers are occasionally missed, the detail is also now and again misleading. To claim Turing for the U.S.A. because he happened to write his thesis at Princeton is, perhaps, a minor distortion. To attribute to Wilkes and Cambridge the first stored program computer would be to do rough justice to Williams, Kilburn and Manchester. But to include the former and omit the latter altogether is nothing short of deliberate insult! Furthermore, there seems no justification for including the CPC (1949) and WHIRLWIND I (1950) as landmarks and omitting SEAC which was, after all, the first stored program computer in the U.S.A. to work (see the table on p. 234: BINAC fans may challenge my assertion if they wish!)

The book costs 51/-, and I think it is worth it for Appendix B alone, although I could wish, for my part, that sufficient details were included to enable one to get a rough estimate of speed on something more complex than the unit employed. This must not be taken to imply any criticism of the person whose name the unit bears! It testifies to the eminence of the leadership of the Society that the only two living Englishmen whose names are mentioned throughout the book are the President and a prominent member of the Council!

A. S. DOUGLAS

THE COUNCIL

(Several members have suggested that short biographies of the present members of the Council of The British Computer Society would be of interest, particularly with the rapid increase of membership throughout the country. It is felt that, especially to many members in the provinces, Council members are only names rather than individuals, and that some outline of their backgrounds will not only be informative but also demonstrate the wide variety of interests covered by the Council.)

BOOTH, A. D.

D.Sc. (London), Ph.D. (Birmingham), F.Inst.P., M.Brit.I.R.E.
Head of the Department of Numerical Automation, London University

After an industrial pupilship in the aircraft industry he was appointed to a British Rubber Producers' Research Association senior scholarship at the Chemistry Department of the University of Birmingham. This led, via research on the crystal structure of explosives, to the degree of Ph.D.; after a year as research physicist to the British Rubber Producers' Research Association, he was appointed Nuffield Fellow at Birkbeck College. A period as Rockefeller Fellow at the Institute for Advanced Study, Princeton, followed in 1947. On returning to England, he was appointed Assistant Director of Research at Birkbeck College Physics Research Laboratory. In 1949 he was appointed visiting Professor of Theoretical Physics at the University of Pittsburgh and, in 1950, Director of the Electronic Computer Project at Birkbeck College, University of London. In 1954 the University of London conferred on him the title of Reader in Computational Methods as Director of the Computational Laboratory, and in 1957 a new Department of Numerical Automation was created, of which he became head.

He is the author of *Fourier Techniques in X-ray Organic Structure Analysis* (Cambridge U.P., 1948), *Automatic Digital Calculators* (jointly with Kathleen H. V. Booth), (Butterworths, 1953 and 1957), *Numerical Methods* (Butterworths, 1955 and 1957), *Machine Translation of Languages* (jointly with W. N. Locke), (Wiley, 1955), *Mechanical Resolution of Linguistic Problems* (jointly with J. Cleave and L. Brandwood), (Butterworths, 1958), and over 140 scientific papers and articles.

BOYLES, E. E.

F.C.A., M.B.I.M.

Also Member of the Council (and a Past-President) of the Institute of Taxation
Chartered Accountant

While a Director of Splintex Safety Glass (Continental) Ltd. and its continental subsidiaries prior to the absorption of the group by Triplex, he developed an interest in mechanisation, organisation and methods techniques and systems management. He now holds posts on the Boards of a number of companies.

He is well known as a lecturer on accounting and management subjects in his own and other professions, and has written articles on a variety of accounting and management subjects.

BRAY, A. J.

M.A. (Oxford), A.C.A.

Manager of Systems Department, Turquand, Youngs and Co.

At Oxford he read jurisprudence and then returned to professional accountancy, having been articled in 1940, qualifying in 1952. He became interested in organisation and method problems during extra-regimental service in the Army in 1945, continuing this interest with the advent of computer technology. He obtained experience in small, medium and large accountancy practices, joining Turquand, Youngs and Co. in 1953.

A lecturer in accounting and systems, he was a founder member of the London Computer Group.

CLEAR HILL, E. C.

B.Sc. (Eng.) (London), A.C.G.I., D.I.C., A.F.R.Ae.S.

Head of Aerodynamics Flight Test Department of the de Havilland Aircraft Company Limited

He read Civil Engineering at London (City and Guilds College) followed by post-graduate aeronautical engineering. With de Havilland Aircraft Company Limited since 1942, he has occupied his present position since 1948. Concerned with the handling of large quantities of data, he became interested in electronic recording and computing methods. He was concerned that there should be recognition of the importance of a co-ordinated national effort in the field conveniently known as Automation and of the fundamental importance of the human aspects created, and was invited to take part in the preliminary and subsequent discussions which led to the creation of the British Conference on Automation and Computation.

DOUGLAS, A. S.

B.Sc. (Est. Man.) (London), M.A., Ph.D. (Cambridge), A.Inst.P.

Also Fellow of the Cambridge Philosophical Society and Former Fellow and Junior Bursar of Trinity College, Cambridge

Director of the Electronic Computing Laboratory, University of Leeds

In 1941 he took the external degree in estate management at London University, and then served for five years in the Royal Signals, more than three of them in India and Burma. After demobilisation in 1946 he went to Cambridge to read mathematics and remained there to do research on theoretical physics under Professor Hartree. He worked from 1950-54 on the application of computers to problems in atomic physics and X-ray crystallography. In 1954 he succeeded Dr. Gill as Visiting Assistant Professor at the University of Illinois, where he took a considerable interest in computer design. From 1955 until he moved to Leeds in 1957, he was Fellow and Junior Bursar of Trinity College, and carried out further research.

From 1951 onward he has taken part in teaching on a series of Summer schools and other courses in Cambridge and in the U.S.A., and, more recently, in Dundee

and Leeds. He is the author of several papers and articles on computers.

DOWSE, R. G.

A.C.A.

Head of Organisation and Methods Department, and Assistant Group Accountant of The Rank Organisation Limited

While attached to the Indian Civil Service, he served in varying capacities for the Government of Assam, including Assistant Labour Commissioner, Secretary to the Rates and Wages Board, and Director of Resettlement and Employment. In 1948 he qualified as a Chartered Accountant, and was awarded a Plender Prize in English Law.

After a period of service with a firm of Lloyd's Insurance Brokers and Underwriting Agents, he joined the Rank Organisation, where he became interested in methods of large-scale data handling, leading to a study of the application of computers to commercial problems.

ELLIS, F. S.

B.Sc.(Eng.) (Aberdeen)

Manager of the Education Department of Elliott Brothers (London) Limited

After serving with the Royal Navy as a Radar Officer he returned to the University of Aberdeen to read Electrical Engineering, and took his Bachelor's Degree in 1948. On joining the Research Laboratories of Elliott Brothers (London) Ltd. as a Research Engineer he worked on radar display circuit design before transferring to the Computer Division in 1950.

Early in 1953 he joined the staff of the National Research Development Corporation, and was associated with the creation of the Computer Patent Pool and the 1958 Computer Exhibition.

In September 1957 he returned to Elliott Brothers to establish the new Education Department. He is responsible for the technical instruction of maintenance and service personnel of all Elliott computers.

GEARING, H. W. G.

B.Sc.(Econ.) (London), A.C.I.S., F.I.S.

Also Fellow of the Royal Statistical Society.

Head of Computer Division, The Metal Box Company Limited

At the London School of Economics he read economics and statistics (Farr Medallist 1935), and continued with post-graduate studies in statistics and econometrics. After four years as a statistical assistant with London Electric Wire Company he joined Metal Box in 1939 as a factory accountant, becoming mechanisation accountant in 1941; head of financial accounts and budgets section from 1949 to 1956, he was then appointed to lead a computer investigation.

Since 1952 he has assisted with the education work of the Association of Incorporated Statisticians, writing the course on applied statistics for Wolsey Hall. He is well known as a lecturer at evening classes in the London area.

GEARY, A.

M.A. (Cambridge), M.Sc.(London)

Also Recognised Teacher, University of London; Member of London University Mathematics Board of Studies and Faculty Board of Engineering; Member of Council of Mathematics Association

Head of Mathematics Department, Northampton College of Advanced Technology

At Cambridge (as a scholar of St. John's College) he read mathematics and, later, studied the history, methods and principles of science at London University. After teaching in grammar schools for some eight years, he joined the staff of the technical college and became interested in numerical analysis in relation to technical problems, and hence in computing.

He is joint author, with Hayden and Lowry, of a series of textbooks on mathematics for technical students. He also organised the original series of lectures and summer schools at Northampton Polytechnic (as it then was) which crystallised the widespread interest in computers by potential business users and led to the formation of the London Computer Group.

GILL, S. (*Representative of Scientific and Engineering Group*)

M.A., Ph.D. (Cambridge)

Also Former Fellow of St. John's College, Cambridge

Head of Computing Research Group, Ferranti Limited

After reading mathematics at Cambridge he spent two years at the National Physical Laboratory (on punched card computing and design of the ACE), and then went back to read physics. He stayed on to do research under Wilkes on the use of the EDSAC. During eighteen months in the U.S.A. he was a Visiting Assistant Professor at the University of Illinois and also lectured at several other places, including summer courses at M.I.T. He has been with Ferranti since 1955.

He is a co-author (with Wilkes and Wheeler) of *The Preparation of Programs for an Electronic Digital Computer* (1951), and author of various papers on computing. Since 1950 he has delivered innumerable lectures on programming, etc., in many different places.

HOLLAND-MARTIN, C. G.

B.A. (Oxford)

Also Fellow of the Royal Meteorological Society

Director of the British Tabulating Machine Company Limited

After reading engineering at Oxford, in 1925 he went to the General Electric Company at Schenectady, New York, Lynn, and Pittsfield, Massachusetts, testing various equipment from turbines to automatic switchgear. He returned to this country in 1927, joining Henry Bessemer and Company, steel-makers, in Sheffield and two years later went to W. T. Henley's Telegraph Works Company Limited, erecting high tension lines. In 1930 he became a consultant engineer with Charles E. Bedaux, and joined the British Tabulating Machine Company Limited in 1933. After a period of five years' war service with the Royal Air Force, he was appointed to the Board of the company in 1951.

HOOPER, D. W. (Chairman of Council)

M.A. (Cambridge), A.C.A.

Chief Organising Accountant, National Coal Board

After reading natural science at Cambridge, qualified as a Chartered Accountant in 1935. He was Chief Accountant and Secretary to a number of companies, in each case carrying out reorganisation of their accounting and costing systems. During the war he served with the R.A.S.C., mostly in Africa, where from 1942 to 1945 he was Food Supplies Officer for Ethiopia and the three Somalilands, responsible for provisioning and stores control. After three years in practice as a management consultant he joined the National Coal Board in 1948, and was appointed Chief Organising Accountant in 1954.

He was British and American Editor of *Office Control and Management* and *The Office Machine Manual* from 1946 to 1950 and joint author of the latter. He has written many papers and articles on the application of computers in industry and commerce, including "Mechanisation, Present and Future" (The Incorporated Accountants' Research Committee, 1954) and is well known as a lecturer. He was associated with A. Geary in the arrangements for the original courses at Northampton College on the business applications of computers and was one of the founders of the London Computer Group, becoming their Chairman.

MUTCH, E. N.

B.Sc.(London), M.A. (Cambridge)

Operational Manager, EDSAC 2, Cambridge University Mathematical Laboratory

After taking a physics degree at London University, he then worked for five and a half years at TRE, Malvern, on airborne radar equipment, until 1948. He then joined the staff of the Cambridge University Mathematical Laboratory, where the EDSAC was under development, becoming operational manager of this machine on its completion in 1949. He occupies the same position in connection with its successor, EDSAC 2.

Since 1950 he has lectured at a number of computer courses at Cambridge University, at technical colleges, and (in 1952) at the Massachusetts Institute of Technology, where he spent the summer working with the group using WHIRLWIND 1.

ROTHEROE, J. E. L. (Representative of Business Group)

Principal in the London County Council

Engaged for over thirty years on accounting and financial work in the Comptroller's Department, he acquired a wide knowledge and practical experience in the use of conventional types of office machines for a variety of accounting purposes. He has also participated in O and M surveys relating to the application of accounting machines in the Council's service.

He has been studying the use of computers for business data processing for several years and for the past three years has been engaged in the investigation of a comprehensive computer system for his authority's work.

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STEVENS, R. E.

A.A.C.C.A., A.M.B.I.M.

Deputy Manager of Statistical Department, The United Africa Company Limited

Since the war, and before joining his present company, he worked in the Accounts and Internal Audit Department. Since the war, and before joining his present company, has worked in the Accounts and Internal Audit Departments of Unilever Limited, based on London and Port Sunlight, Cheshire. In the latter capacity he visited many of the offices and factories of the Unilever Group in the United Kingdom examining office methods and procedures, many of which incorporated the use of office machinery.

The United Africa Company Limited, which he joined in 1957, have joint use of a computer and are actively studying methods of applying it to the problems of the Statistical Department.

YATES, F.

Sc.D., F.R.S.

Head of the Statistics Department of Rothamsted Experimental Station

Since 1931 he has been at Rothamsted and has been in charge of the Statistics Department since 1933. In 1947 the Department was extended to constitute an Agricultural Research Statistical Service for the Agricultural Research Council and the Ministry of Agriculture and Fisheries. He was a member of the United Nations Sub-Commission on Statistical Sampling from 1947 to 1952.

An electronic computer was installed in the Department in 1954.